

WHAT IS CLAIMED IS:

1. A reflective liquid crystal display (LCD) apparatus comprising:

a transparent first substrate;

a transparent electrode arranged on the first

5 substrate;

a second substrate;

a switching element arranged on the second substrate;

an insulation film arranged on the switching element
10 and having a convex/concave structure;

a reflection electrode arranged on the insulation film along the convex/concave structure and connected to the switching element; and

15 a liquid crystal layer sandwiched between a transparent electrode of the first substrate and the reflection electrode of the second substrate;

wherein the insulation film protects the switching element after formed and the convex/concave structure is formed by irregular arrangement of regions having 20 different thickness values.

2. The reflective LCD apparatus as claimed in Claim 1, wherein the convex/concave structure has a continuous smooth shape.

3. The reflective LCD apparatus as claimed in Claim 1, wherein the insulation film is a single-layered film made from a single material.

4. The reflective LCD apparatus as claimed in Claim 1, wherein the insulation film has a light absorption characteristic.

5. The reflective LCD apparatus as claimed in Claim 1, wherein the convex/concave structure has a plurality of protrusions arranged irregularly.

6. The reflective LCD apparatus as claimed in Claim 5, wherein the protrusions have an island shape or a line shape in a plan view.

7. The reflective LCD apparatus as claimed in Claim 1, wherein the convex/concave structure has a plurality of indentations arranged irregularly.

8. The reflective LCD apparatus as claimed in Claim 7, wherein the indentations have a hole shape or a line shape in a plan view.

9. The reflective LCD apparatus as claimed in Claim 1, wherein the convex/concave structure is formed by repetition of an irregular convex/concave shape based on one or more than one pixels.

10. The reflective LCD apparatus as claimed in Claim 1, wherein the insulation film is made from an organic resin or inorganic resin having photosensitivity.

11. A reflective LCD apparatus production method for producing the reflective LCD apparatus as claimed in one of Claims 1 to 10, wherein the convex/concave structure is formed by performing photolithography to the insulation film to form a predetermined pattern while

leaving a predetermined film thickness, so as to form regions having a large film thickness and regions having a small film thickness arranged irregularly in a plan view.

12. A reflective LCD apparatus production method for producing the reflective LCD apparatus as claimed in one of Claims 1 to 10, wherein the convex/concave structure is formed by steps of:

5 forming the insulation film,

photolithography for forming a resist pattern on the insulation film,

etching the insulation film leaving a predetermined film thickness at a lower portion of the insulation film,

10 peeling off the resist film from the insulation film, and

thermal treatment of the etched insulation film to melt the insulation film and make the convex/concave structure smooth.

13. A reflective LCD apparatus production method for producing the reflective LCD apparatus as claimed in one of Claims 1 to 10, wherein the convex/concave structure is formed by steps of:

5 forming the insulation layer using an organic insulation material or inorganic insulation material having photosensitivity,

performing exposure for forming a convex/concave pattern on the insulation layer,

10 performing development for performing etching-
development so as to leave a predetermined film thickness
at a lower portion of the insulation film, and

15 performing thermal treatment of the etched and
developed insulation film to melt the insulation film and
make the convex/concave structure smooth.

14. A reflective LCD apparatus production method for
producing the reflective LCD apparatus as claimed in one
of Claims 1 to 10, wherein the contact hole connecting
the convex/concave structure and the switching element to
5 the reflection electrode is formed by steps of:

forming the insulation layer using an organic
insulation material or inorganic insulation material
having photosensitivity,

10 performing exposure for forming a pattern for
forming the convex/concave structure and the contact hole
in the insulation film, and

performing development for simultaneously forming
the convex/concave structure leaving a predetermined film
thickness and a through contact hole.

15. The reflective LCD apparatus production method
as claimed in Claim 14, wherein the photosensitivity is
positive type, and the step of exposure is performed in
such a manner that a smaller exposure light quantity is
5 applied for formation of the convex/concave pattern and a
greater exposure light quantity is applied for formation
of the contact hole pattern.